Building the Nation's Next Generation Operational Polar-Orbiting Weather Satellite

Scott C. Asbury, PMP

Ball Aerospace & Technologies Corp. – Boulder, Colorado

Poster #675

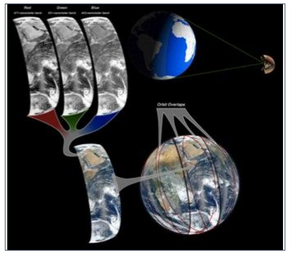
What is JPSS-1?

JPSS-1 is the Nation's next-generation, operational, polar-orbiting weather satellite being procured by NASA Goddard Space Flight Center on behalf of NOAA. The JPSS-1 spacecraft bus and its five instrument payloads are currently in full-scale production. Ball Aerospace is the provider of the JPSS-1 spacecraft bus, the Ozone Mapping and Profiler Suite (OMPS) payload and is the satellite integrator. JPSS-1 follows the successful Suomi National Polar-orbiting Partnership (S-NPP) satellite launched in October 2011. JPSS-1 will replace S-NPP after launch in the 2nd quarter of GFY 2017.

Keeping Americans safe from extreme weather events through storm tracking, enhanced weather prediction capabilities, and long-term climate monitoring is the cornerstone of the JPSS mission. The environmental monitoring which JPSS-1 will provide will advance weather forecasting and environmental prediction in many sectors, improving the ability of the public, Government, first responders, and businesses to plan for the future.

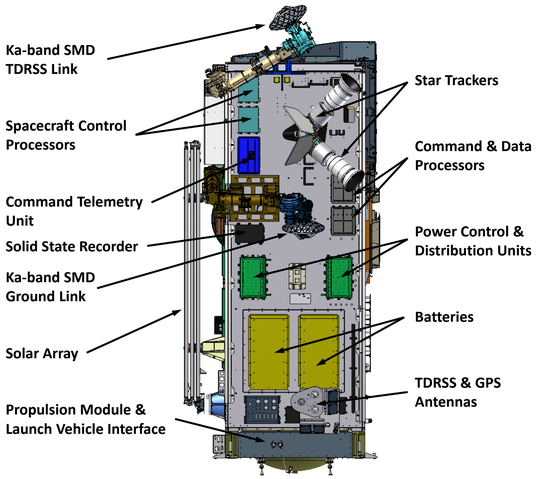
What is a Polar Orbit? Why Use a Polar Orbit?

- Polar orbits are ~90 degree inclination orbits, useful for spacecraft that carry out mapping or surveillance operations.
- Since the orbital plane is nominally fixed in inertial space, the planet rotates below a polar orbit, allowing the spacecraft low-altitude access to virtually every point on the surface.
- A polar orbit offers daily global coverage, by making ~14 polar orbits daily.



JPSS-1 Spacecraft Zenith Deck Layout

(Launch configuration)



JPSS-1 is an *Enhancement* of the S-NPP Design

- Ball BCP-2000 spacecraft bus
- Planned launch 2Q GFY 2017
- 7-year mission life requirement
- Orbit: 824 km, sun-synch (98.7 deg), 1330L ascending node
- Observatory Mass (MEV): 1979 kg (dry)
- S/C Power (MEV): 1619 W (orbit average)
- 1553 & *SpaceWire* data networks
- Hydrazine propulsion system
- ADCS: 3-axis stabilized
- S-band Command & Telemetry
- Ka-band 300 Mbps Stored Mission Data link to ground network
- Ka-band 300 Mbps Stored Mission Data back-up link to TDRSS
- X-band High Rate Data direct broadcast @ 15 Mbps
- Same payload instrument complement as S-NPP

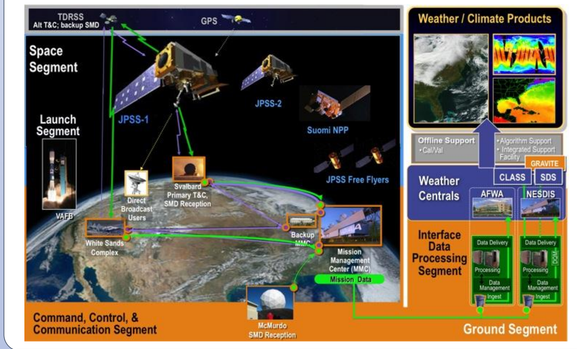
AUTHOR CONTACT INFORMATION

Scott C. Asbury, Sr. Program Manager, JPSS-1 Spacecraft
Ball Aerospace & Technologies Corp.
sasbury@ball.com

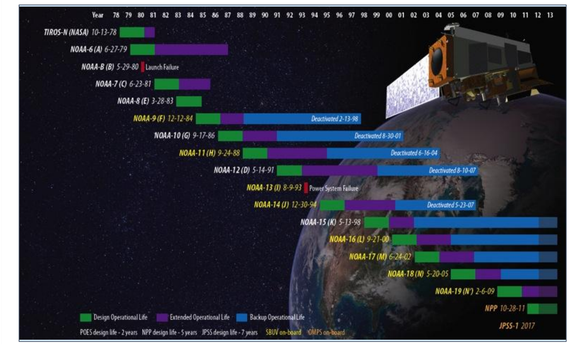
Advanced Payloads Provide Critical Operational Weather Data & Long-Term Climate Observations

- **Visible/Infrared Imager Radiometer Suite (VIIRS)**
  - A scanning radiometer, collects visible and infrared imagery and radiometric measurements of the land, atmosphere, cryosphere, and oceans
- **Cross-track Infrared Sounder (CrIS)**
  - A Fourier transform spectrometer with 1305 spectral channels will produce high-resolution, three-dimensional temperature, pressure, and moisture profiles
- **Advanced Technology Microwave Sounder (ATMS)**
  - A cross-track scanner with 22 channels, provides sounding observations needed to retrieve profiles of atmospheric temperature and moisture
- **Ozone Mapping and Profiler Suite (OMPS)**
  - An advanced suite of hyperspectral instruments, extends the 25-plus year total-ozone and ozone-profile records
- **Clouds and the Earth's Radiant Energy System (CERES)**
  - A three-channel radiometer, measures both solar-reflected and Earth-emitted radiation from the top of the atmosphere to the surface

Joint Polar Satellite System Mission Architecture

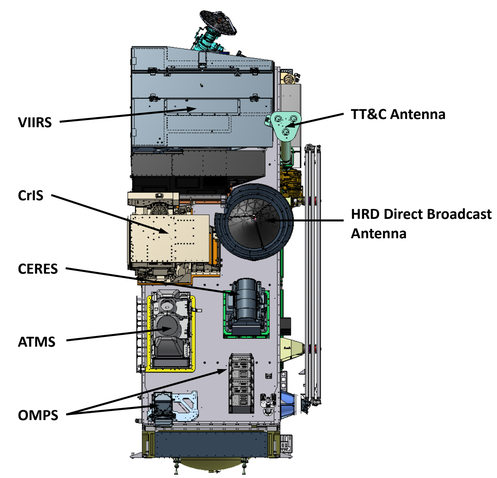


Timeline of NOAA Polar Orbiting Weather Satellites



JPSS-1 Spacecraft Nadir Deck Layout

(Launch configuration)



January 2013